

What is claimed is:

1. An assembly for collecting data on product usage from a product roll by monitoring the amount of product pulled or removed from a roll during one or more dispensing events, comprising:

5 a spindle configured for communication with a product roll;

a rotating member;

a sensor operably connected to the spindle, the sensor being capable of detecting the degree of movement of the rotating member upon removal of product from the roll.

2. The assembly of claim 1 in which the assembly further comprises:

a recording device in communication with the sensor, the recording device being adapted for receiving and recording data transmitted to the recording device from the sensor.

3. The assembly of claim 2 in which the recording device is capable of recording data representing the degree of movement of the rotating member, whereby said movement is proportional to the amount of product pulled from the roll.

4. The assembly of claim 1 in which the rotating member further comprises an emitter adapted to release signals that may be received by the sensor.

5. An assembly as in claim 1 in which the sensor is capable of supplying a signal representing data indicating the number of separate pulls for a given dispensing event.

6. An assembly as in claim 1 in which the sensor is capable of supplying a signal representing data comprising the number of pulls executed per roll.

7. An assembly as in claim 3 in which data representing:

(a) the time a pull is taken, and

(b) a corresponding date said pull was taken,

are stored in the recording device.

8. The assembly of claim 4 further comprising a first microprocessor for providing electronic control of data collection and signal transmission.

9. The assembly of claim 1 in which the sensor comprises switches.

10. The assembly of claim 9 in which the sensor comprises switches that are magnetically activated.

11. The assembly of claim 9 in which the sensor comprises switches that are mechanically activated.

12. The assembly of claim 9 in which the sensor comprises switches that are optically activated.

13. The assembly of claim 10 in which the rotating member further comprises magnets, in which switches are capable of generating signals in response to movement of the magnets.

14. The assembly of claim 13 in which the magnets are spaced along the periphery of the rotating member.

15. The assembly of claim 13 in which the sensor comprises at least one switch, and the rotating member comprises at least one magnet, in which the movement of the magnet past the switch during rotational movement of the spindle is capable of generating signals that are representative of the degree of rotational movement of the rotating member relative to the spindle.

16. An apparatus for collecting data on products released from a roll, comprising:

a spindle configured for releasable attachment to a product roll;

a rotating member connected to the spindle;

a sensor, the sensor being capable of detecting rotational movement of the rotating member relative to the spindle, wherein the sensor further comprises

i) magnetically activated switches, and

ii) magnets,

whereby movement of the magnets relative to the magnetically activated switches by rotation of the rotating member in relation to the spindle is capable of generating electrical signals.

17. The apparatus of claim 16 further comprising:

a recording device in communication with the sensor, the recording device being adapted for receiving and recording signals generated by the magnetically activated switches.

18. The apparatus of claim 16 further wherein the apparatus is capable of transmitting data representing the degree of movement of the rotating member.

19. The apparatus of claim 16 in which at least two magnetically activated switches are employed.

20. The apparatus of claim 16 in which at least two magnets are employed.

21. The apparatus of claim 16 in which at least three magnets are employed.

22. The apparatus of claim 16 in which at least four magnets are employed.

23. The apparatus of claim 16 in which at least three magnetically activated switches are employed.

24. The apparatus of claim 16 in which at least six magnetically activated switches are employed.

25. The apparatus of claim 16 further comprising a first microprocessor, in which signals representing data generated by the sensor of the spindle apparatus are provided to the microprocessor.

26. The apparatus of claim 25 further comprising a clock in operable connection to the first microprocessor.

27. The apparatus of claim 25 further comprising a battery operably connected to the first microprocessor.

28. The apparatus of claim 25 in which a software program directing the microprocessor is capable of retrieving and manipulating data.

29. The apparatus of claim 25 in which the product released is selected from the group of products comprising: ribbon, chain, rope, cording, sheet materials, paper, nonwovens, textiles, synthetic materials, tape, banding material, yarn, and nonwoven filaments.

30. The apparatus of claim 25 in which the product released is rolled paper.

31. The apparatus of claim 25 in which the product released is paper towels.

32. The apparatus of claim 25 in which the product released is toilet paper.

33. A spindle device comprising a means for storing instructions, said instructions adapted to be executed by a processor, said instructions when executed by the processor executing a process comprising the steps of:

(a) collecting data representing a plurality of pulling events for dispensing product from a roll, wherein each pulling event correlates with

a measured value representing the amount of product removed from the roll at a given time, and

(b) sending a signal representing said data to a receiver.

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34. The spindle device of claim 33 in which the processor executes the process having the following additional step:

(c) storing the data in a recording device.

35. The device of claim 34 further comprising:

(d) transmitting signals representing the data from a recording device to a second processor located externally to the spindle device.

36. The device of claim 34 further wherein the device comprises in part a spindle which interacts with the roll, further wherein the steps performed include:

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(d) sending signals representing the data to a second processor which is located externally to the spindle, and

(e) displaying the data.

37. The device of claim 33 further wherein the spindle device further comprises a sensor.

38. A method for tracking usage parameters of product pulled from a roll, in which the product upon the roll is separated into a plurality of units along its machine direction, whereby a series of pulls comprise a dispensing event, the method comprising:

5 (a) obtaining data related to rotation of a rotating member in a spindle apparatus, the data representing values proportional to the degree of rotation of the rotating member;

(b) providing a first microprocessor capable of receiving and processing said data; and

10 (c) computing by said first microprocessor a set of parameters or values from said data comprising at least one of the following:

- 15
- i) the number of units per event,
 - ii) the number of pulls per event,
 - iii) the number of pulls per roll,
 - iv) the number of units per day,
 - v) the number of events per day,
 - vi) the frequency of events per time of day (hour),
 - vii) the frequency of the number of units per time of day;
 - viii) the number of units per hour,
 - 20 ix) the time interval between pulls,
 - x) the frequency of time interval between pulls,
 - xii) the frequency of length of pull,
 - xii) the date and corresponding time of each pull; and
 - xiii) the total amount of product dispensed at a particular
 - 25 time.

39. A method of collecting data representing the amount of product pulled from a roll in one or more pulling events, comprising:

(a) providing a data acquisition device operably connected to a product roll;

5 (b) accumulating data using said data acquisition device, the data comprising at least the amount of product pulled from a plurality of rolls in multiple pulling events;

(c) providing a first microprocessor;

10 (d) providing an electronic linkage from the data acquisition device to the first microprocessor;

(e) validating the data;

(f) transferring the data from the data acquisition device to a first microprocessor capable of manipulating data;

15 (g) computing values representing the amount of product pulled from the roll and the corresponding time said amount was pulled; and

(h) sending a signal representing the data to a receiver.

40. The method of claim 39 in which the receiver is device that makes an audible sound.

41. The method of claim 39 in which the receiver is a device that makes a visible signal.

42. The method of claim 39 in which product is identified automatically using a Product Code reader.

43. The method of claim 39 in which the data is validated.

44. The method of claim 39 in which the signal is sent by wireless means.

45. The method of claim 39 in which the signal is sent by telephone.

46. The method of claim 39 in which the receiver is a second microprocessor.

47. The method of claim 39 in which the receiver is a computer having a second microprocessor.

48. The method of claim 39 in which the receiver is a computer at a roll distribution center.

49. The method of claim 39 in which the receiver is capable of regulating the supply of rolls made available.

50. A method for collecting and transmitting data related to the amount of product pulled from a product roll in a series of dispensing events, comprising:

(a) providing a spindle assembly operably connected to a product roll;

(b) accumulating data using said spindle assembly, the data comprising at least the amount of product pulled from the roll with a corresponding date and time;

(c) providing an electronic linkage from the spindle assembly to a receiver; and

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(d) transmitting a signal comprising in part said data from the spindle assembly to the receiver.

51. The method of claim 50 in which the receiver is device that makes an audible sound.

52. The method of claim 50 in which the receiver is a device that makes a visible signal.

53. The method of claim 50 in which the receiver is a device that records the data in a memory.

54. The method of claim 50 in which multiple product rolls providing multiple data sets are employed.

55. The method of claim 50 in which the signal is sent by wireless means.

56. The method of claim 50 in which the signal is sent by telephone.

57. The method of claim 50 in which the receiver is a second microprocessor.

58. The method of claim 50 in which the receiver is a computer having a second microprocessor.

59. The method of claim 50 in which the receiver is a computer at a roll distribution center.

60. The method of claim 50 in which the receiver is capable of regulating the supply of rolls made available to the spindle assembly.

61. The method of claim 50 in which the product is a sheet material.

62. The method of claim 61 in which the product is a toilet tissue.

63. The method of claim 61 in which the product is a paper towel.

64. The method of claim 50 wherein the data comprises values representing at least one parameter selected from the group of parameters comprising: the amount of units used per pulling event, the time interval between pulling events, the number of pulls per event, the number of rolls per pull, the number of sheets dispensed per day, and the position of the sheet material on the roll.

65. A method for replenishing an inventory of product dispensed from rolls, comprising the steps of:

(a) providing a data acquisition device having a rotating member that turns about a spindle, the device being operably connected to a roll dispenser;

(b) pulling product from the roll;

(c) accumulating data using said data acquisition device, the data including the degree of rotation of a rotating member about the spindle;

(d) calculating from said data the length of product depleted of the roll;

(e) providing an electronic linkage from the data acquisition device to a first processor, the first processor being capable of receiving and manipulating the data,

- 15 (f) calculating with the first processor the amount of rolled material remaining on the roll,
- (g) comparing the amount of rolled material available with a predetermined threshold amount, and
- (h) transmitting a signal to notify a receiver the result of the comparing step (g).

66. The method of claim 65 in which the receiver is device that makes an audible sound.

67. The method of claim 65 in which the receiver is a device that makes a visible signal.

68. The method of claim 65 in which the receiver is a device that records the data in a memory.

69. The method of claim 65 in which the receiver is at a remote location.

70. The method of claim 65 in which the signal is sent by wireless means.

71. The method of claim 65 in which the signal is sent by telephone.

72. The method of claim 65 in which product is identified automatically using a product code reader.

73. The method of claim 65 in which the receiver is a computer having a second microprocessor.

74. The method of claim 65 in which the receiver is a computer at a roll distribution center.

75. The method of claim 65 in which the receiver is capable of regulating the supply of rolls made available to the rotating member.

76. The method of claim 65 in which the product is a sheet material.

77. The method of claim 76 in which the product is a toilet tissue.

78. The method of claim 76 in which the product is a paper towel.

79. The method of claim 65 in which the additional step of validating the data is performed.

80. The method of claim 65 in which the receiver is capable of billing a customer for the amount of product consumed.

81. A time and date record recorded by a spindle assembly in the dispensing of product from a roll, wherein the time and date record is established by monitoring a series of pulling events for dispensing sheet material from a roll, wherein each pulling event correlates with a measured value representing the rotation of a rotating member in relation to the spindle assembly, the amount of rotation being proportional to the amount product removed from the roll.